

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Klickitat River Coho (Outplant from Washougal Hatchery)
Species or Hatchery Stock	Type N Coho Salmon (Oncorhynchus kisutch)
Agency/Operator	Washington Department Fish and Wildlife
Watershed and Region	Klickitat Subbasin/Columbia Gorge Province
Date Submitted	nya
Date Last Updated	August 11, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Klickitat River- Washougal Hatchery Type N Coho

1.2 Species and population (or stock) under propagation, and ESA status.

Type N Coho (*Oncorhynchus kisutch*)

ESA Status: Not listed.

1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Manager of Mitchell Act Funds
Yakama Nation	Co-manager

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources	
Mitchell Act	
Operational Information	Number
Full time equivalent staff	5.0
Annual operating cost (dollars)	\$587,000

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Washougal Anadromous Fish Programs and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Washougal Hatchery Type N Coho; Lewis River Hatchery Type N Coho
Broodstock collection location (stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal; Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis; and Merwin Trap/North Fork Lewis River/RKm 25.8/Lewis
Adult holding location (stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal ; Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis
Spawning location (stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal ; Lewis River Hatchery Trap/North Fork Lewis River/RKm 20.9/Lewis
Incubation location (facility name, stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal
Rearing location (facility name, stream, RKm, subbasin)	Washougal Hatchery/Washougal River/RKm 32.2/Washougal

1.6 Type of program.

Isolated Harvest – (Mid and Lower Columbia River)

1.7 Purpose (Goal) of program.

- From Washougal Hatchery - Direct plant 2.5 million coho smolts into the Klickitat River.
- Produce coho salmon to help mitigate for fish losses in the Columbia River Basin for activities within the Columbia River Basin that have decreased salmonid populations including federal dams. Coho smolts released into the Klickitat are solely for harvest opportunity.
- Benefit sport and tribal fisheries at the mouth of the Klickitat River, in-river sport fisheries, and mixed stock ocean fisheries.

1.8 Justification for the program.

- The coho production program is funded through the Mitchell Act via NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The “Mitchell Act” (Act) (Public Law 75-502) was passed in 1938.
- Federal Court Decisions (US vs. Oregon and US vs. Washington) ruled that Indian Tribes who signed treaties with the federal government in the 1850’s have treaty rights to harvest a share (50%) of surplus fish resources.
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Pacific Northwest Electric Power Planning and Conservation Act.
- U.S. v Oregon court agreements.
- Columbia River Fisheries Development Program
- Columbia River Fish Management Plan

In order to minimize impact on listed fish by WDFW facilities operation and the Klickitat N coho

program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Klickitat Coho program. Operational risks apply to the Washougal and Klickitat Hatchery operations. The coho for this program are planted directly into the river at two locations.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.2	Water rights are formalized thru trust water right S4-*07272 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002).
Effluent Discharge	4.2	This facility operates under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-5002.
Broodstock Collection & Adult Passage	7.9	Broodstock collection is not applicable for this program.
Disease Transmission	7.9, see also 10.11	<i>Fish Health Policy in the Columbia Basin.</i> Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See section 1.10.

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

1.10.1) "Performance Indicators" addressing benefits. (Program up to release occurs at Washougal Hatchery)

1.10.1 Benefits:

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Assure that hatchery operations support Columbia River fish Mgt. Plan (<i>US v Oregon</i>), production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average of .30% smolt-to-adult survival (range .01% - 1.69%) that includes harvest plus escapement.	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity Maintain effective population size.	A minimum of 500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return (Washougal or Lewis)	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (WDFW 1983)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	(60,000 Ad+CWT) for evaluation purposes	Returning fish are sampled throughout their return for length, sex, and mark
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly for pathogens at Washougal and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites.	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites.	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

Klickitat River Type N Coho (Plant via Washougal Hatchery) HGMP

1.10.1 Risks:

Risks		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (20.0 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups)	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, in stream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and in stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Broodstock collection occurs at Washougal or Lewis River Hatchery. WDFW has established an egg take goal of 5,100,000 eggs in the Future Brood Document (FBD 2004), which includes this portion planted to the Klickitat River. See Washougal or Lewis river HGMPs.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	2,500,000 FBD	20.0	Mid-April	Klickitat	RKm 29.0 & 12.0	Klickitat	Columbia Gorge

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Brood Year	SAR (%)	Total Catch*	Escapement (BY)*
1988	Na	Na	Na
1989	Na	Na	Na
1990	Na	Na	Na
1991	Na	Na	Na
1992	Na	Na	Na
1993	Na	Na	Na
1994	.05	1,200	Na
1995	.05	1,200	Na
1996	.20	4,900	Na
1997	Na		Na
1998	Na		Na
1999	.22	5,300	Na
2000	.15	3,600	Na
2001	Na	Na	Na
2002	Na	Na	Na
2003	Na	Na	Na
Avg.	.13	3,240	Na

No escapement for coho occurs. Annual Coded-Wire Tag Program, Washington Missing Production Group, Annual Report 2000.

1.13 Date program started (years in operation), or is expected to start.

The *U.S. v. Oregon* Columbia River Fish Management Plan has mandated releases of up to 4.0 million coho in the river annually since 1988.

1.14 Expected duration of program.

The program is on-going with no planned termination.

1.15 Watersheds targeted by program.

Klickitat Subbasin/Columbia Gorge Province

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues:

Stock used is Lower Columbia River from any of the hatcheries below Bonneville Dam. At present time number of released smolts is 3.5 million with 1 million released at Klickitat Hatchery. There are a number of problems with this program that needs addressing. River intake does not meet ESA screen guidelines, there is no screen on intake only bar rake to keep out large debris. The rearing pond used till release annually has up to 300 cubic yards of sediment settling in pond resulting of reduced rearing space by about 30-40%. The settling pond was not properly designed and only functioned one season till the first flood event and has been inoperable for the last five years. Using river water for rearing is not the best choice has it is high in turbidity, high in sediment load, and extreme temperature fluctuations, all these items lead to the fact that eight of the last twelve years we have not been able to meet our program goals due to disease issues. All of these issues above are in conjunction with the coho rearing pond only.

1.16.2 Potential Alternatives:

Alternative 1: Develop springs across river from hatchery for pathogen, fish, and sediment free rearing water. This would be the best alternative to eliminate problems of sediment, disease, and extreme water temperatures fluctuations. Although not measured, it has been estimated that as much as 5000+gpm could be captured and utilized.

Alternative 2: River intake needs to be redesigned to meet proper screening guidelines. Even with the redesign of the intake, problems with sediment plugging screen mesh and spawning adults above intake structure. Remain.

Alternative 3: Properly designed settling pond to remove up to 300 cubic yards of sediment annually. Placement of river intake and rearing pond only allows for 3 feet of drop to head of pond with settling pond in the middle and adjacent wetlands further hindering placement or expansion of settling pond.

Alternative 4: Move entire program to lower river acclimation site. There are no sites in place at this time. The Yakama Nation is planning an acclimation site at RM 17 that could accommodate this program.

1.16.3 Potential reforms and investments:

Reform/Investment 1: Construct a catch basin to collect all spring water coming off hillside and transfer pipe to Coho rearing pond. No feasibility study has been done \$\$\$\$.

Reform/Investment 2: Design and construction of river intake to meet ESA screening requirements. This could be a substantial investment with high sediment load and coarseness of material \$\$\$\$.

Reform/Investment 3: If development of spring does not occur, and the program continues with river, the settling pond will need to be improved to handle a flow of 15.6cfs and up to 300 cubic yards of sediment annually. Maintenance and equipment for the removal of material from settling pond will be needed. An access road will have to be constructed to accommodate large trucks to remove material from site. \$\$\$\$.

The hatchery program is part of a strategy to meet conservation and/or harvest goals for the target stock. The tables below indicate what the short- and long-term goals are for the stock in terms of stock status (biological significance and viability), habitat and harvest. The letters in the table indicate High, Medium, or Low levels for the respective attributes. Changes in these levels from current status indicate expected outcomes for the hatchery program and other strategies (including habitat protection and restoration).

	Biological Significance	Viability	Habitat
Current Status	L	H	L
Short-term Goal	L	H	M
Long-term Goal	L	H	M

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

Program is described in the “Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 99)”. Statewide Section 6 consultation with USFWS for interactions with Bull Trout, and concurrent with this HGMP to satisfy Section 7 consultations: WDFW is writing HGMP’s to cover all stock/programs produced at Lower Columbia and Mid-Columbia hatcheries. For Klickitat this will include; fall Chinook, spring Chinook, summer steelhead, and on station coho, as well as this direct plant from Washougal.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability	Habitat
Summer Steelhead-Natural	L	L
Winter Steelhead-Natural	L	L
Bull Trout- Natural	Unknown	L
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

WDFW, SaSI 1998

2.2 Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program

No NMFS ESA listed populations will be directly affected by this program.

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that may be incidentally affected by the program

Middle Columbia River Steelhead March 19, 1998; 64 FR 14508, Threatened. Within the Middle Columbia River Steelhead ESU, hatchery STHD stocks from outside the ESU are imported and released into the White Salmon (Skamania Hatchery winter and summer steelhead), Klickitat (Skamania Hatchery winter and summer steelhead) and Walla Walla (Lyons ferry), The BRT concluded that the Middle Columbia steelhead ESU is not presently in danger of extinction, but reached no conclusion regarding its likelihood of becoming endangered in the foreseeable future. All BRT members felt special concern for the status of this ESU and concluded that NMFS should carefully evaluate conservation measures affecting this ESU and continue monitoring its status. Winter steelhead are reported within this ESU only in the Klickitat River and Fifteenmile Creek; we have no abundance information for winter steelhead in the Klickitat River, but they have been declining in abundance in Fifteenmile Creek.

The current status of summer and winter run steelhead in the Klickitat River is not known. These runs are believed to be native to the system. Lack of funding and the inherent difficulty conducting population surveys in this river contribute to the current lack of knowledge. The Yakama Nation (YN) has conducted population surveys in the Klickitat River to gather

information on steelhead. They've conducted spawning ground surveys in a limited number of tributaries in the basin and operated downstream smolt traps. The YN estimated an annual escapement of 260 steelhead per year based on spawning ground survey data collected from 1996 to 2000 (NMFS 2000a). These spawning ground surveys cover less than 50 percent of the available spawning habitat for steelhead in the Klickitat River basin (B. Sharp, YN, pers. comm.). Results from the smolt traps are insufficient to make any productivity conclusions. The trap placements in the river were not effective at catching fish. The YN is currently relocating the smolt traps to more efficient trapping locations (MCRM FMEP 2003).

Columbia Basin DPS Bull Trout June 10, 1998 (63 FR 31647), Threatened.

The Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout (*Salvelinus confluentus*) as a threatened species under the Endangered Species Act on June 10, 1998 (63 FR 31647). The Lower Columbia Recovery Unit Team identified two core areas (Lewis and Klickitat rivers) within the recovery unit. The Klickitat Core Area includes all tributaries downstream to the confluence with the Columbia River. Recent evidence indicates both resident and adfluvial bull trout may be present in the basin. The abundance and distribution of the stock is poorly known. There are insufficient data to make an assessment. However, it appears that there are very few bull trout in the lower- to mid-Klickitat drainage. Bull trout appear to be more abundant in the upper drainage where habitat conditions are more favorable than in the lower drainage. Four bull trout up to 10 inches in length were observed during snorkel surveys in the upper mainstem (RM 64, above the West Fork) and 23 bull trout (three to seven inches in length) were observed during electrofishing surveys in Trappers Creek. Portions of the West Fork upstream of Fish Lake Stream contain an isolated naturally reproducing population of bull trout. We do not know the impacts of hatchery salmon and steelhead in the main Klickitat River on bull trout/Dolly Varden have been. Generally, in drainages colonized by anadromous salmon and steelhead, char successfully co-exist by occupying a different ecological niche.

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Describe hatchery activities: The following activities listed below are general hatchery actions that are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999).

Broodstock Program:

Broodstock Collection: See Washougal and Lewis River Type N Coho HGMPs.

Genetic introgression: Coho are not believed to be native to the Klickitat watershed; Lyle Falls (RM 2.2) was impassable to coho at the time the adults arrived in the late summer and early fall. This stock is of non-native origin and is sustained by hatchery production. Since 1988, Type N coho smolts from Washougal, Lewis, and Klickitat Hatcheries have been released and these releases have resulted in a small population of naturally spawning fish. Recent (1997-1999) spawner surveys indicate an average escapement of 500 hatchery adults. Spawning occurs between RM 5.2 and RM 42.0 on the mainstem (Draft Klickitat Subbasin Summary November 15, 2000). This population is not considered part of the proposed listed Lower Columbia coho ESU. Straying level is unknown, but the program has been reared, acclimated and imprinted to the yearling smolt stage at this facility and heavy harvest occurs on this mass marked program. No take with listed species exists.

Rearing Program:

Operation of Hatchery Facilities: This is a direct plant to the Klickitat River. See Washougal

Type N HGMP.

Disease: Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Washougal Hatchery programs. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks. Prior to transfer, the program population health has been determined by the area fish health specialist. Indirect take from disease are unknown.

Release Program:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Up to 3.85-million coho are released annually (1 million from Klickitat, 3 million from Washougal). This off-station plant occurs earlier in the year and at lower locations of the river than the on station release from Klickitat Hatchery and could be well dispersed from the system by that time. This program is hauled and planted at a life history stage and time that indicates fish are beginning a smolting period that will result in fish emigrating quickly to minimize density-dependent effects on listed fish. Acclimation sites for this program are a high priority for the future. Indirect take from density dependent effects is unknown.

Competition: Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

- 1) As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that “migrant fish will likely be present for too short a period to compete with resident salmonids.” On station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).
- 2) NMFS (2002) noted that “.where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates.”
- 3) Flagg et al. (2000) concluded, “By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource”. Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids.” Flagg et al (2000) also stated “It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment.”
- 4) Fresh (1997) noted that “Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prev size) significantly

changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results.”

- 5) Studies from Fuss (2000) on the Elochoman River and Riley (2004) on two Willapa Bay tributaries (Nemah and Forks Creek) indicate that hatchery reared coho and Chinook can effectively leave the watershed within days or weeks.

Predation (Freshwater): Coho yearlings from this program may prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population of salmonids, the habitat in which the population occurs and the characteristics of the hatchery program (e.g., release time, location, number released and size upon release). The site-specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have been empirically estimated the predation risks to listed species posed by the Klickitat coho releases. In the absence of site-specific empirical information, the identification of risk factors can be a useful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented.

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG 1984 for a review) with risk greatest in small systems during periods of low flow and high clarity. The Klickitat River system is large and one of the longest undammed rivers in the Northwest, approximately 95 miles in length. Glacially fed, runoff starts in late spring and peaks in mid-summer. Glacial till greatly reduces visibility. Release of programs from Klickitat corresponds with this flow regime. Yearly flows range from a low of approximately 500-800 cfs in early fall to a high of 2000-5000 cfs in the winter and during runoff (USGS Real Time Data 2004).

Dates of Releases: The release date can influence the likelihood that listed species are encountered. These fish are planted by early April. Most listed steelhead emerge later in the window of release or are not available at that time. Summer and winter steelhead in the Klickitat spawn from early March through early June (SaSI 2002). Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching which indicates listed fish are not available until April to early July.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The “33% of body length” criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994;

NMFS 2002). WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the “33% of body length criterion” until further species data for the Klickitat River can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time that fish co-mingle in the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Coho salmon and steelhead released from western Washington artificial production programs are in a smolted condition and have typically been found to migrate rapidly downstream. Data from Seiler et al. (1997; 2000) indicate that coho smolts released from the Marblemount Hatchery on the Skagit River migrate approximately 11.2 river miles day. Steelhead smolts released on station may travel even more rapidly – migration rates of approximately 20 river miles per day have been observed in the Cowlitz River (Harza 1998). However, trucking fish to off station release sites, particularly release sites located outside of the watershed in which the fish have been reared, may slow migration speeds. The current release locations are at Rkm 28.0 and lower in the system at Rkm 15.0. Future plans of WDFW and the Yakama Tribe are to explore lower river sites at Rkm 36.0 for acclimation facilities and release sites in this system.

Besides the risk factors above, we have provided a summary of empirical information and a theoretical analysis of competition and predation interactions that may be relevant to the plant of coho to the Klickitat River.

Potential Klickitat River Type N coho predation and competition effects on listed salmonids: The proposed annual production goal for this program is 2.5 million fish. As fish are directly planted, securing lower river acclimation sites are the highest priority as migration studies have generally acknowledged that releasing smolts from acclimation sites increases migration rates from the system. The Klickitat River is a fast flowing river system that could help with migration rates. This window of release (April) could encounter listed fish (steelhead) in the subbasin and Columbia mainstem. Releases are targeted at 20 fpp (124 mm fl). Competition with young of the year listed fish would be unlikely due to life stage differences and habitat occupied. Predation on emerging steelhead is minimized as the release occurs in advance of most steelhead emergence (Table 2). Competition with listed steelhead smolts would be unlikely as both stocks would be actively migrating as smoltification and outmigration of listed steelhead are believed to occur in April and May, peaking in early May (Draft Klickitat Subbasin Plans 2000). At 20 fpp (124 mm fl), potential predation on listed fish if encountered would be on fish of 41 mm fl and smaller. Indirect take from predation and competition is unknown.

Table 2. Lower Columbia Steelhead Spawn and Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25 th	May 13 – June 15	May 27- July 7	June 17	LCSI Draft 1998
Summer	February April	March 20-30 th	April 14 – May 18	April 28 – June 2	May 15	Kalama Research Report (Hulett, Sharp 2003)

Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, volitional release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) on length of fish are measured through out the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize size variation and re-programmed as needed to achieve goals for smolt size at time of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration.
- Minimal residualism from WDFW coho programs following these guidelines has been indicated from snorkeling studies on the Elochoman River (Fuss 2000). Indirect take due to residualism is unknown.

Migration Corridor/Ocean: It is unknown to what extent listed fish are available both behaviorally or spatially on the migration corridor. Once in the main stem, Witty et al. (1995) has concluded that predation by hatchery production on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. Evidence in estuarine and nearshore environments indicate that diets are often dominated by invertebrates with Durkin (1982) reporting that diet of coho smolts (128-138 mm fl) in the Columbia River estuary was composed almost entirely of invertebrates without evidence of salmonids as prey (HSRG - Hatchery Reform 2004). There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean. Indirect take in the migration corridor or ocean is unknown.

Monitoring:

Associated monitoring and evaluation and research programs: The WDFW received funding to install and operate a fish trap on the number 5 fishway at Lyle Falls, located at RM 2.2 on the Klickitat River. The fish trap will be installed in the spring of 2003 and operated for two fiscal years ending in 2005. This trap will provide WDFW with much needed data on escapement of salmon and steelhead into the Klickitat River. These data will provide the beginning of a database WDFW will use for fisheries management. The Yakama Nation (YN) conducts annual spawning ground surveys on index streams in the Klickitat River basin and operates two smolt traps to determine productivity. However, the spawning ground surveys cover less than 50 percent of the available spawning habitat in the basin and the efficiency of the smolt traps is not optimal (B. Sharp YN, pers. comm.). The YN is expanding the spawning ground surveys to cover more of the basin and relocating the smolt traps to more productive trapping locations. Data are not available to accurately estimate annual escapement or basin productivity. Scientific protocols are followed to limit impact on these activities. Additional concerns would be communicated to NOAA staff for adaptive management. Indirect take from these activities is unknown.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is

not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. No direct take tables will be included in this document.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Any mortality from this operation or other Klickitat Hatchery operations basis would be communicated to Fish Program staff for additional guidance. For other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist who, along with the Complex Manager, would determine an appropriate plan and consult with NOAA for adaptive management review and protocol.

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review Report and Recommendations - NPPC document 99-15*). Explain any proposed deviations from the plan or policies.

For ESU-wide hatchery plans, the plant of coho to the Klickitat River is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin
- 1999 Review of Artificial Production of Anadromous and Resident Fish in the Columbia River Basin
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994)
- The *U.S. v. Oregon* Columbia River Fish Management Plan
- NWPPC Fish and Wildlife Program
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Klickitat Subbasin Anadromous Fishery Master Plan

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations for the production of coho for the Klickitat River:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon.. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be use to maintain genetic variability within the hatchery populations.

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- Klickitat Subbasin Anadromous Fishery Master Plan
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy

3.3 Relationship to harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

A Federal court decision in 1969 (*U.S. vs. Oregon*) ruled that Columbia River Treaty Tribes who signed treaties with the federal government in the 1850s are entitled to half of all harvestable salmon and steelhead destined for the tribes' traditional fishing grounds. This court decision mandated fisheries management cooperatively in a government-to-government relationship between the states of Oregon and Washington and the Treaty Indian tribes.

All WDFW-regulated anadromous fisheries in the Mid Columbia River Region (MCMA) Fish Management and Evaluation Plan (FMEP March 2003) are conducted in cooperation with the parties of *U.S. vs. Oregon*. *U.S. v. Oregon/Columbia River Compact* *U.S. v. Oregon/Columbia River Compact* fisheries Technical Advisory Committee impact assessments are evaluated through Section 7/10 consultation process. Commercial fishery seasons on the portion of the mainstem Columbia River where the states of Oregon and Washington share a common boundary are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact). Meetings are held in late January of each year to establish the harvest guidelines for the spring and summer fisheries and in late July to establish guidelines for fall commercial and sport fisheries.

Current estimates of the late coho harvest rate in ocean and mainstem fisheries is 88 percent, while ocean and mainstem recoveries of coded-wire-tagged late coho from Klickitat Hatchery accounted for 98 percent of total recoveries. Based on this information, it seems unlikely that more than 5,000 fish will reach the subbasin annually from a total run size of 50,000. Late coho appear to enter the Klickitat River after the peak of the summer steelhead run, on the basis of tribal fishery monitoring data. The timing of the late coho run should make it possible to harvest a large proportion of the run without interfering with summer steelhead rebuilding efforts. Adult coho almost never make it up to the Klickitat Salmon Hatchery (68 km) and do not seem to consistently penetrate the Klickitat River much farther than 3 km prior to laddering Lyle Falls. Therefore, no coho natural escapement goal has been set. This stock is not managed to provide adequate escapement to the Klickitat Hatchery (Klickitat Sub-basin Plans 2000). The plant of coho smolts from Washougal contributes significantly to this fishery.

The *U.S. v. Oregon* Columbia River Fish Management Plan recognized the importance of tribal harvest in the Klickitat River by mandating releases of 4.0 million fall chinook and 3.85-million coho in the river annually since 1988. With these releases, sales of fall chinook and coho have provided a steady contribution to tribal commercial fall season fisheries, with sales to licensed commercial fish buyers averaging nearly 1,500 fall chinook and 2,000 coho annually since 1989 (Table 2). In addition to this harvest, Yakama Nation fisheries staff estimate that another 1,000 to 3,000 chinook, 500 to 2,500 coho, and 200 to 500 steelhead are harvested annually by tribal fishers and either sold directly to the public or taken home for subsistence use (Klickitat Sub-basin Plans 2000).

Brood Year	SAR (%)	Total Catch*	Escapement (BY)*
1988	Na	Na	Na
1989	Na	Na	Na
1990	Na	Na	Na
1991	Na	Na	Na
1992	Na	Na	Na
1993	Na	Na	Na
1994	.05	1,200	Na
1995	.05	1,200	Na
1996	.20	4,900	Na
1997	Na		Na
1998	Na		Na
1999	.22	5,300	Na
2000	.15	3,600	Na
2001	Na	Na	Na
2002	Na	Na	Na
2003	Na	Na	Na
Avg.	.13	3,240	Na

No escapement for coho occurs. Annual Coded-Wire Tag Program, Washington Missing Production Group, Annual Report 2000.

3.4 Relationship to habitat protection and recovery strategies.

The program described in this HGMP is consistent with the following habitat and protection strategies:

Yakama Nation Fisheries Program (YNFP):

The Lower Klickitat Riparian and In-Channel Habitat Enhancement Project is a BPA-funded watershed restoration project implemented by the Yakama Nation Fisheries Program (YNFP). The YNFP is working in coordination with WDFW, Natural Resources Conservation Service (NRCS), and the Central Klickitat Conservation District. The project was proposed under the Northwest Power Planning Council's Fish and Wildlife Program and funded by BPA in 1997. Initial project restoration projects were located within the Swale Creek and Little Klickitat River watersheds. Included in the project scope of work are in-stream structural modifications, re-vegetation of the riparian corridor, construction of sediment retention ponds to provide late-season flow to the creek, and exclusion fencing to prevent channel degradation from livestock. A monitoring program has been initiated to document project success and guide future restoration activities. The second phase of the project will use EDT modeling output to guide and prioritization restoration activities.

Subbasin Planning and Salmon Recovery:

The current Klickitat program HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Klickitat Sub-Basin Summary May 17, 2002) is a broad-scale initiative that will provide building blocks of recovery plans for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals.

Habitat Treatment and Protection:

WDFW and others are conducting, or have conducted, habitat inventories within the Klickitat subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which document barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis:

A WRIA 30 (Klickitat Basin) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission. This limiting habitat factors analysis was conducted pursuant to RCW 75.46 (Salmon Recovery). The purpose of this analysis was "to identify the limiting factors for salmonids" where limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon." It was intended that a locally based habitat project selection committee use the findings of this analysis to prioritize appropriate projects for funding under the state salmon recovery program. This analysis may also be used by local organizations and individuals interested in habitat restoration to identify such projects (Washington State Conservation Commission 2000).

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Klickitat coho program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Klickitat coho smolts can be preyed upon thru the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays along the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters, and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted thru a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological

effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including URB chinook and steelhead programs are released in this system and limited natural production of chinook, coho, and steelhead occurs in this system along with numerous non-salmonid fishes (sculpins, lampreys and sucker etc.). Except for yearling stocks (coho and steelhead), these species may serve as prey items during the emigration thru the basin. While not always desired from a production standpoint, hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Successful or non-successfully spawner adults originating from this program may provide a source of nutrients in oligotrophic coastal river systems and stimulate stream productivity. Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003).

4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* Klickitat River coho smolts can be preyed upon thru the entire migration corridor from the river subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can predate on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters, and Orcas.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

5.3 Broodstock holding and spawning facilities.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

5.4 Incubation facilities. Takes place at Washougal Hatchery.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

5.5 Rearing facilities.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

5.6 Acclimation/release facilities.

Future acclimation sites in the lower river are being developed for this program by the Yakama Tribe and WDFW.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

Section 6. Broodstock Origin and Identity

6.1 Source.

Acceptable stocks are any lower river Type N coho. The stocks used most often for the 2,500,000 smolt program to the Klickitat River are the Washougal Type N coho and Lewis River Type N coho. These stocks originated from Cowlitz Late stock coho and were introduced to the Washougal Hatchery in 1985.

6.2.1 History.

Multiple Type N Coho programs have made up the stock. Current production is from Lewis River.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Cowlitz Hatchery Type N Coho	H	1985	U
Washougal Hatchery Type N Coho	H	1999	U
Lewis River Hatchery Type N Coho	H	1995	Present
Kalama River Hatchery Type N Coho	H	1999	U
Elochoman Hatchery Type N Coho	H	1999	U

6.2.2 Annual size.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

6.2.3 Past and proposed level of natural fish in the broodstock.

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

6.2.4 Genetic or ecological differences.

Since coho were not believed to be native to the Klickitat River, existing natural coho are believed to be from hatchery plants.

6.2.5 Reasons for choosing.

These plants began in 1988 and are to be made in addition to the existing Klickitat Hatchery program. The broodstock chosen has the desired life history traits to meet harvest goals as late coho have the advantage of extending the period of fishing opportunity. As with fall chinook, coded-wire-tag data indicates that most of the coho adults originating from Klickitat Hatchery are harvested before reaching the subbasin. Management of sport and treaty fisheries in the Klickitat Subbasin is substantially the same as that described earlier for other species. Escapement of coho is not currently a constraint in Klickitat River harvest management as brood stock is generally obtained from lower river hatchery facilities.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Not applicable to this direct plant. See Washougal Hatchery N Coho HGMP.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

7.2 Collection or sampling design

Not applicable to this direct plant. See Washougal Hatchery Type N Coho HGMP.

7.3 Identity.

Acceptable stocks are any lower river Type N coho. The stock used most often for the 2,500,000 smolt program to the Klickitat River is the Washougal N coho and Lewis River Type N coho. These stocks originated from Cowlitz Late stock coho and were introduced to the Washougal Hatchery in 1985.

7.4 Proposed number to be collected:

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

7.6 Fish transportation and holding methods.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

7.7 Describe fish health maintenance and sanitation procedures applied.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

7.8 Disposition of carcasses.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

Section 8. Mating

8.1 Selection method.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

8.2 Males.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

8.3 Fertilization.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

8.4 Cryopreserved gametes.

None were used for this program.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.1.2 Cause for, and disposition of surplus egg takes.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.1.3 Loading densities applied during incubation.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.1.4 Incubation conditions.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.1.5 Ponding.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.1.6 Fish health maintenance and monitoring.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.2 Density and loading criteria (goals and actual levels).

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.3 Fish rearing conditions.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.4 Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

In past years, natural side channel rearing was used on approximately 600,000 fish from this program. This was to explore lower river acclimation sites and included holding, rearing and imprinting of fish enclosed within mainstem side channels. The side channel rearing stopped when subsequent high water events isolated side channels from the river.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Not applicable to this direct plant. See Washougal River Hatchery or Lewis River Hatchery Type N Coho HGMP.

Section 10. Release

10.1 Proposed fish release levels.

2,500,000 coho smolts.

10.2 Specific location(s) of proposed release(s).

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yearling	2500000	20	April	Klickitat River	29.0 & 12.0	Klickitat	Columbia Gorge

Fish are NOT released in the same subbasin as the rearing facility.

10.3 Actual numbers and sizes of fish released by age class through the program.

Release Year	Yearling Release		
	No.	Date (MM/DD)	Avg Size (fpp)
1991	nya	nya	nya
1992	820400	April	20
1993	2500000	April	20
1994	1850801	April	20
1995	288200	April	25
1996	827927	April	18
1997	nya	nya	nya
1998	731059	April	18
1999	1244089	April	18
2000	521726	April	17
2001	1870911	April	20
2002	2453166	April	19
2003	2554300	April	20.5

10.4 Actual dates of release and description of release protocols.

In 2003, tanker trucks from Washougal Hatchery started hauling 2.5 million on March 31 with the project taking until April 9. Two plant sites in the lower river are used,; one at RKm 28.0 and the other at RKm 15.0.

10.5 Fish transportation procedures, if applicable.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck (From Green River Hatchery in Puget Sound)	4500	yes	no	150	Sodium chloride	5% solution

10.6 Acclimation procedures (*methods applied and length of time*).

Coho for this program are reared to smolts at the Washougal Hatchery. Program smolts are transported from the Washougal Hatchery and directly released into the Klickitat River. Prior to release, Klickitat river water is circulated in the tanker vessel to acclimate fish to water temperature of the receiving waters. Implementing acclimation sites in the lower river is a high priority for the future. Successful acclimation will provide better survival and return rates, providing increased harvest and natural production opportunities. Acclimation sites are being located and constructed to facilitate multi-species usage.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

For Brood year 2003 (release year 2005), 90,000 fish (3.0%) of the program production will be adipose/CWT marked as an index group for management purposes. The remaining 2,410,000 smolts are not marked as per US vs. Oregon agreements.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

None, program levels are plus or minus 5%.

10.9 Fish health certification procedures applied pre-release.

The population condition and health is determined by fish health specialists and for the presence of “reportable pathogens” as defined in the PNFHPC disease control guidelines, within 3 weeks prior to hauling at Washougal Hatchery.

10.10 Emergency release procedures in response to flooding or water system failure.

As fish are transferred and released in the Klickitat River, truck failure options may include release of fish in locations close to the Klickitat watershed, after communication with WDFW Region staff.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of only smolts through fish culture and historical releases practices fosters rapid seaward migration with minimal rearing of delay in the rivers, limiting interactions with naturally produced steelhead juveniles.
- Index marking allows for evaluation and survival data.
- The Yakama Nation transition plan calls for moving all coho releases to lower Klickitat River acclimation sites in the future for imprinting and volitional releases.
- The release of only smolts in lower river reaches are below known wild fish spawning and rearing habitat.
- Smolts planted at a smaller size - 20 fpp (124 mm fl) minimizes predator/prey length impacts.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Klickitat coho plants programs are communicated to Region 5 staff for any risk management or if needed, treatment. See also section 9.7.

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

See the draft Klickitat Subbasin Master Plan (contact Bill Sharp, Yakama Nation) for monitoring and evaluation program details. **Klickitat Subbasin Master Plan 11**

2.2.3 *Klickitat coho*

Overall Goal: Focus the Klickitat coho program on harvest augmentation, with a combined annual average harvest (ocean, Columbia River, and Klickitat basin) of approximately 14,000 coho, while releasing in-basin production capacity for priority species (spring chinook and steelhead).

Objective C1. Reduce efforts to establish a natural run of coho in the Klickitat subbasin.

Strategy C1a. Beginning in approximately 2006, eliminate production of approximately one million coho at Klickitat Hatchery, and phase out direct stream releases of coho in the Klickitat subbasin if harvest goals can be met with acclimated smolts.

Strategy C1b. Install an adult trap at the outfall of the Wahkiacus acclimation site.

Objective C2. Maximize survival of coho releases to ensure continuation of substantial returns of coho to Columbia and Klickitat river fisheries.

Strategy C2a. Develop a new acclimation site (Wahkiacus) for coho in the lower Klickitat subbasin.

Strategy C2b. Beginning in 2006, release one million coho smolts (transferred from facilities in the Lower Columbia Basin) from acclimation site(s) in the lower Klickitat subbasin.

Objective C3. Maintain a combined average annual harvest (ocean, Columbia River, and Klickitat basin) of approximately 14,000 coho.

Strategy C3a. Continue direct stream releases of coho pre-smolts until studies show that acclimated smolt releases can meet harvest goals.

Strategy C3b. If the 1 million acclimated smolt releases meet harvest goals, investigate alternative locations in the Columbia Basin above Bonneville Dam for release of the 2.5 million *U.S. v. Oregon* coho currently programmed for the Klickitat subbasin that are scatter planted directly into the river.

Objective C4. Monitor and evaluate factors that will help to determine whether goals and objectives are being achieved.

Strategy C4a. Monitor and evaluate survival of acclimated and direct-stream-released coho.

Strategy C4b. Monitor and evaluate harvest numbers of acclimated and direct-stream released coho.

Strategy C4c. Conduct spawning surveys in the Klickitat basin to determine location and amount of natural coho spawning.

Strategy C4d. Use findings from Yakima and upper Columbia Basin studies in conjunction with information from risk assessments to target ecological interactions studies in the Klickitat basin.

Strategy C4e. Use the regional mark information system (RMIS) to monitor CWT recoveries of Klickitat coho releases in marine and freshwater fisheries coast-wide.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

None are committed through Mitchell Act funding. Through a multi-species BPA funded M&E program, some coho M&E functions are performed.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Scientific protocols are followed and adaptive management plans will be planned.

Section 12. Research

12.1 Objective or purpose.

No research is conducted for this program.

12.2 Cooperating and funding agencies.

12.3 Principle investigator or project supervisor and staff.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

12.6 Dates or time periods in which research activity occurs.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8 Expected type and effects of take and potential for injury or mortality.

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).

12.10 Alternative methods to achieve project objects.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

“I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by _____ Date: _____

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Mid - Columbia River Steelhead
Activity	Klickitat River Type N Coho (Plant)
Location of hatchery activity	Lewis River Hatchery, Washougal Hatchery
Dates of activity	April –May
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	0	nya
Removal (e.g., broodstock (e)	nya	nya	0	nya
Intentional lethal take (f)	nya	nya	0	nya
Unintentional lethal take (g)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

- a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
- c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- e. Listed fish removed from the wild and collected for use as broodstock.
- f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- h. Other takes not identified above as a category